

Kentucky Geological Survey

228 Mining & Mineral
Resources Bldg.
University of Kentucky
Lexington, KY
40506-0107
(859) 257-5500
fax (859) 257-1147
www.uky.edu/KGS

James Cobb, State
Geologist and Director
John Kiefer, Assistant
State Geologist
Carol Ruthven, Editor,
Kentucky Geology

Our mission is to
increase knowledge and
understanding of the
mineral, energy, and
water resources, geologic
hazards, and geology of
Kentucky for the benefit of
the Commonwealth and
Nation.

Refining data input for the HAZUS model — Does site-specific geology make a difference?

Steve Cordiviola of the Kentucky Geological Survey has contributed to the refinement of data input for HAZUS, which is the Federal Emergency Management Agency's (FEMA) computer model for earthquake-loss estimation. The model is used by federal, state, and local officials, as well as the insurance industry, to help estimate potential damage to buildings, roads, pipelines, and other infrastructure that may occur if there is an earthquake. FEMA chose to use a default parameter that represented a homogenization of the geology of the entire nation. To demonstrate the importance of using more refined geologic data, Steve Cordiviola and Robert Bauer of the Illinois State Geological Survey ran the computer model using geologic maps and data for site-specific geologic material for Evansville, Ill., and surrounding area. The ranking of risk factors for

specific areas did differ when the generalized geology and the site-specific geologic data were used as inputs. The analysis and results using the site-specific data assist emergency-response planners in making more accurate decisions about where best to allocate their resources. Not all areas are subject to the same risk, so it is important to allocate resources according to the risk associated with each area.

This work demonstrates the importance of using geologic maps and site-specific data to provide accurate analysis for research and emergency planning. This is a valuable contribution, as the HAZUS model is used to design building codes and for emergency planning in areas that are identified as being most vulnerable to earthquake damage. This is particularly true in large urban areas with a concentration of buildings,

transportation infrastructure, and people, where property damage and loss of life due to earthquakes could be devastating. In addition, examples such as this illustrate the benefit of interstate collaboration and federal-state cooperation in research to promote the public interest of minimizing the risk of damage from natural hazards. ❖

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Geologic mapping

KGS provides data for National Geologic Map Database Project

An essential part of the National Geologic Mapping Act of 1992 and its subsequent reauthorization in 1997 was the establishment of a national geologic map database. The database is being established by the U.S. Geological Survey. The project's first product was an Internet-based, searchable catalog of available geologic maps for the country. The second phase will implement digital geologic maps in a database so that the map contents can be viewed using the Internet. Further information about the project can be found at ncgmp.usgs.gov/ngmdbproject/.

Geologists at KGS are supplying data for 64 quadrangle maps at a scale of 1:24,000 (1 inch on the map equals 2,000 feet on the ground) for a prototype of the national database. KGS geologists are cooperating with the U.S. Geological Survey and authors of the North American Data Model, the database structure for geologic maps, to design and test the database methodology. Jerry Weisenfluh assisted in preparing and presenting a preliminary version of the prototype at the national meeting of the Geological Society of America in Reno, Nev., in November 2000. For more information, contact **Jerry Weisenfluh** at (859) 257-5500 or by e-mail at jerryw@kgs.mm.uky.edu. ❖

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Director's Desk

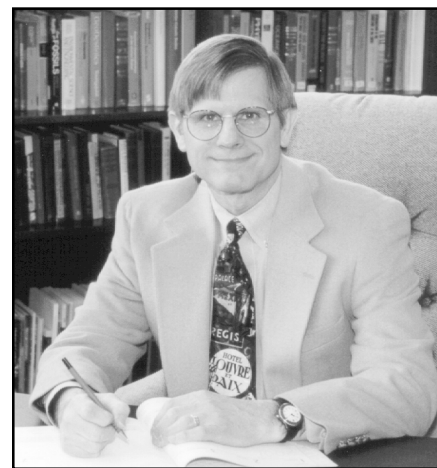


One reward of being director is seeing the culmination of research and development of new products. Last year, we completed 33 publications, and we have 15 in preparation. We initiated a digital publication series. At a press conference in November 2000, we announced the release of a digital coal atlas for Kentucky. This press conference attracted the attention of our local newspaper, evening television broadcast, and radio broadcasts. Even *USA Today* commented on the importance of this new product.

Too often in the past, at the conclusion of an important research effort, we found ourselves unable to get the word out. Our press releases were distributed, but they had little impact on

the media or the public. Press printing was and continues to be expensive. Many of our research reports and maps are now being released on our Web site and on CD-ROM. While inexpensive to produce and distribute, these digital products cannot be used by everyone.

We are continually looking for new technology to provide maps, data, and information to our customers with the ease and constant availability of the Internet. Our Web site is outstanding for its content, links to other informative sites, maps, and sample data sets. Many of our publications are available online as Adobe® portable document format (PDF) files. We are building a searchable, online version of our list of publications. I remain committed to improving effective public communication. We must get the word out to share the results of our research and explain



the value of our expertise. We welcome your input and appreciate the comments we have received. ♦

James C. Cell

Mark your calendar

KGS Distinguished Lecture and Forum—April 2 and 3

Dr. Patricia Wood Dickerson, Scientist, NASA Johnson Space Center, will deliver the 2001 KGS Distinguished Lecture in the evening of April 2. The subject of Dr. Dickerson's lecture will be Earth/Moon/Mars planetary analogues and will feature spectacular color images from NASA space missions. During the morning of April 3, Dr. Dickerson, Dr. Haluk Cetin, Assistant Professor, Department of Geosciences, Murray State University, and Mr. Robert Andrews of the Kentucky Geological Survey will be panelists in a forum to discuss the use of remote-sensing and other technology for water-resource assessment. For more information, contact **Carol Ruthven** at (859) 257-5500 or by e-mail at cruthven@kgs.mmm.uky.edu. ♦

In Memory—Phil Miles, 1914–2000

Distinguished Kentucky geologist will be missed

Phil Middleton Miles of Lexington, Ky., died November 4, 2000. He was a geological engineer, registered petroleum engineer, and partner with Miles & Wells Consulting Geologists. Born in Eminence, Ky., on February 6, 1914, he received his bachelor's and master's degrees from the University of Kentucky. He also did 1 year of postgraduate study at the University of Chicago. He served as chairman of the Kentucky Geological Survey Advisory Board, as well as on numerous other boards.

During his service in World War II as a geologist, Phil was recruited to interpret aerial photographs and topographic maps. Returning from the war, Phil realized that there were only a few topographic maps for Kentucky, and these maps lacked adequate detail. His war experience helped him recognize

the value of having more detailed maps at a 1:24,000 scale. In 1949, as the director of the Maps and Minerals Division of the Agricultural and Industrial Development Board, he secured State support for initiation of a topographic mapping program for Kentucky using the latest photogrammetric surveying methods. When the last of 763 topographic quadrangle maps for Kentucky was completed in 1956, Kentucky became the first state to be completely covered by 7.5-minute, 1:24,000-scale topographic maps. This was a milestone in the history of the State and Nation. The success of this program initiated by Phil Miles provided the foundation for future geologic maps and digital geologic mapping by the Kentucky Geological Survey. ♦

Subsurface geology

Well Sample and Core Library to feature new exhibits

To promote a better understanding of the rocks and minerals occurring beneath the Earth's surface and demonstrate how they can be used for research and exploration, **Patrick Gooding**, manager of the Well Sample and Core Library, will organize several exhibits on various aspects of subsurface geology throughout 2001. Each exhibit will be displayed for 2 months. The library is located at 2500 Research Park Drive off Iron Works Road, Lexington. For further information, contact Patrick Gooding at (859) 389-8810 or by e-mail at gooding@kgs.mmm.uky.edu. The exhibits in the next few months will be:

- ♦ February and March—Subsurface methods and techniques used in exploration
- ♦ April and May—Examination of well cuttings for research
- ♦ June and July—Study of a Middle Ordovician core from the Lexington Limestone ♦

On December 11, 2000, KGS released the Kentucky digital coal atlas, consisting of 12 maps and charts showing original and remaining coal resources in eastern and western Kentucky for six historically important coals. Nine of the new maps and charts pertain to resources in eastern Kentucky and three show resources in western Kentucky. Additional maps for western Kentucky will be published in the future.

The coal atlas is the culmination of years of extensive field work, data collection, and analysis. The atlas is unique because it was produced using state-of-the-art computer technology for creating digital geologic

maps and very detailed information about coal resources in Kentucky. The detailed assessment of coal resources required for the completion of the atlas has been under way since 1996, with partial funding from the U.S. Geological Survey (USGS) as part of a national program to assess remaining coal resources available for mining. The atlas, which is available as computer files on a CD-ROM or as traditional paper maps, can be viewed on the KGS Web site at www.uky.edu/KGS/coal/webcoal/pages/coal/nca_refs.htm.

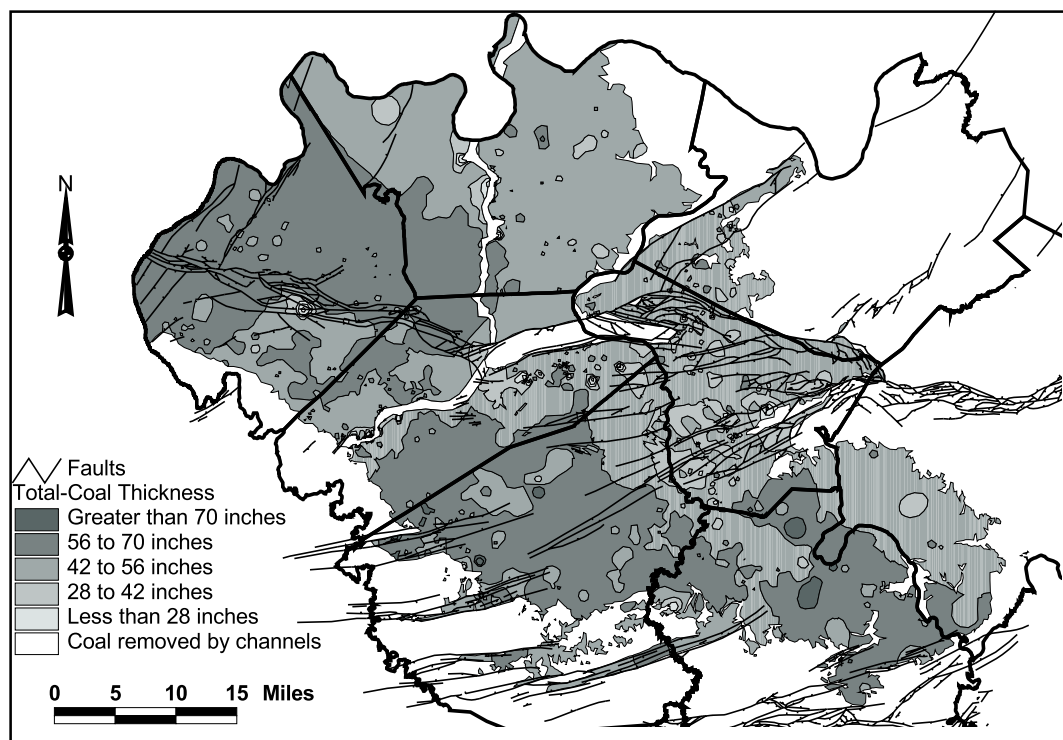
Previous estimates of coal resources have been published primarily as tables of data with information

about the tons of coal available for mining. In contrast to this, maps present visually the distribution of remaining coal resources and thereby add value to the data. The maps that constitute the atlas illustrate the geographic distribution of the coal-resource data. This digital coal atlas is a road map for Kentucky coal and describes the characteristics that will have an impact on their future development. This new product, based on significant contributions of data from private industry, has greatly improved our understanding of the coal resources of Kentucky and has allowed KGS to provide the most detailed description of the resource available to date for Kentucky.

"This work is a significant accomplishment for Kentucky and the USGS.

The digital maps provide valuable information that is accurate, unbiased, and current to decision makers in government and industry."

*—Bonnie McGregor,
USGS Eastern Regional
Director*



"The digital coal atlas will be essential for energy policy makers; coal companies active in exploration; and environmental, land-use, and transportation planners."

*—Jerry Weisenfluh,
Principal Investigator
for the Kentucky Coal
Atlas Project*

Example of data and a map included in the Kentucky digital coal atlas—total coal thickness of the Springfield coal in western Kentucky. This illustration is a gray-scale rendition of the original color version in the digital coal atlas.

How can the coal atlas be used?

The digital coal atlas will benefit a broad spectrum of people, businesses, and organizations in Kentucky and elsewhere. Historical mining is documented to show the location, thickness, and depth of coal resources that remain available for future mining. Information in the atlas describes the size and area of coal beds in relation to the land surface. Geologists at KGS are able to do this with greatly improved accuracy due to its detailed geologic mapping database. No other state in the nation has comparable data to assess coal resources.

Coal thickness and the depth of the coal below the land surface are also described. This is done using discrete measurements of the coal at locations where samples of coal were collected in the field. Kentucky has one of the most comprehensive coal-thickness databases in the nation based on decades of data collection in the field. Maps were then created showing the geographic distribution of coal thickness.

Coal-thickness data are used to calculate coal tonnages that were present prior to mining. Coal thickness is one of the most important factors that determine the ability to mine the coal.

Who will the atlas help?

Coal Industry Officials—Information and analysis in the digital coal atlas indicate that geographic shifts in coal production may occur in the foreseeable future. The maps and charts show the degree of depletion of resources, the extent of the remaining coal available for future mining, and thickness and elevation of the coal, which will be useful to coal industry officials seeking reserves to replace those that are currently being mined. Many companies have already found the maps beneficial in exploring for new reserves of coal. The maps provide a regional perspective of where historical mining has taken place for specific coal beds and the nature of the remaining coal in adjoining areas. Company officials

will also be interested in the site-specific measurements of coal beds in areas of commercial interest to them. In addition, the digital atlas can be used together with information that a company has in its records to identify potential reserves to meet their needs.

Persons Interested in Coal-Resource Assessment—The maps and charts in the coal atlas describe the most important coal beds in Kentucky. These coal beds are ones that have had the greatest historical and recent production. Although the six coal beds described in the atlas constitute a small number of Kentucky's total number of coals, they represent much of Kentucky's present annual production.

Energy Policy-Makers—Persons studying energy policy can use these maps to gain a regional perspective on the status of Kentucky's coal resource. The assessment in this atlas indicates that much of eastern Kentucky's remaining resources are relatively thin (less than 42 inches). State lawmakers have already begun to recognize this issue by passing legislation that created tax credits for mining thin coal, and this tax relief has already had a positive impact on increasing coal production. The distribution and thickness of remaining resources is illustrated and will help determine areas of the Commonwealth that will likely contribute significantly to future coal production.

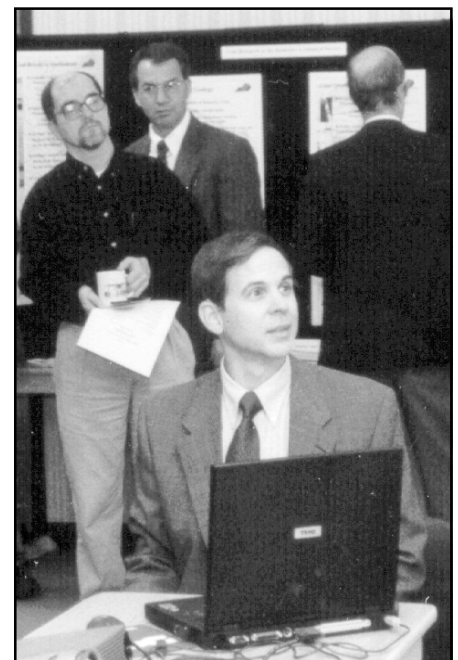
Transportation Planners—The digital coal atlas will allow transportation planners to quickly undertake a preliminary assessment of a proposed highway or road to determine if it would encounter old abandoned coal mines. The atlas could also be used to determine the cost of acquiring private minerals in rights-of-way on the proposed route for highway construction projects. This information may permit early route adjustments to avoid costly segments.

Mine Safety and Environmental Planning Officials—Information on the extent and depth of coal mines in specific areas will be valuable to study the impacts of underground mining on land use. Other charts in the coal atlas have information about mining charac-

teristics and coal quality, which will be useful for mine safety and environmental planning. The data can also be used to identify areas for developing water resources from abandoned underground mine works in regions where water is difficult to locate.

How do I order the atlas?

Paper copies of the individual maps and charts that constitute the digital coal atlas are available for a nominal charge of \$10 each. Anyone interested in the digital coal-bed data used to compile the maps can purchase data sets on a single CD-ROM for \$30. For further information, please call the KGS Publication Sales office at (859) 257-3896 or toll-free at (877) 778-7827 for customers living outside of Lexington. ♦

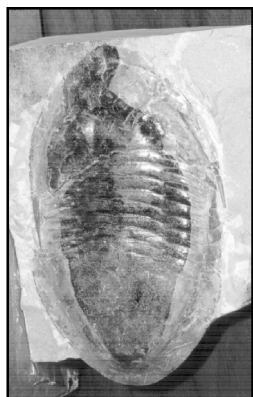


Jerry Weisenfluh demonstrates the coal atlas CD-ROM at a press conference in December 2000.

Field notes from across Kentucky

Trilobite donation

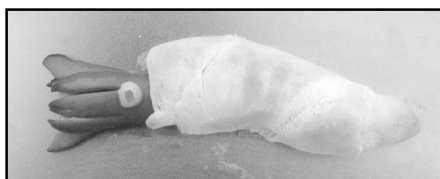
On September 25, 2000, Mr. and Mrs. George Stone of Carterville, Ill., donated part of a private collection of trilobite fossils to KGS. The estimated value of the 24 donated specimens of the genus *Isotelus* is \$5,000. Trilobites are a type of extinct arthropod. They were similar to modern-day roly-poly or pill bugs and they lived in marine waters. George and Janet Stone collected the fossils primarily from a site in Bowling Green, Mo., where the fossils were found in Maquoketa Shale; the fossils are Late Ordovician in age (440 to 450 million years old). The trilobites can be viewed in the Mining and Mineral Resources Building on the University of Kentucky campus. For more information, contact **Don Chesnut** at (859) 257-5500 or by e-mail at chesnut@kgs.mm.uky.edu. ❖



One of the trilobite fossils donated by Mr. and Mrs. Stone.

Web goodies

Explore our Web site, where you can find a fact sheet on trilobites, instructions for making Mardi Gras trilobite masks, and recipes for trilobite cookies and other paleontological goodies at www.uky.edu/KGS/education/activities.html. ❖



A cephalopod snack—mmm, mmm, mmm!

KGS co-hosts interstate coal symposium

KGS, the state geological surveys of Indiana and Illinois, and the U.S. Geological Survey co-hosted a symposium on October 25, 2000, in Indianapolis, Ind., to promote dialogue between those who produce, use, and regulate coal in the Illinois Basin. The symposium featured nine speakers who addressed the critical factors affecting the future of coal production and usage in the three-state region. They discussed strategies for improving mining and consumption; the characteristics of Illinois Basin coal and how it compares with other coals mined nationally; the effect environmental regulations have had, and will continue to have, on Illinois Basin coal; and the impact of new coal-utilization technologies. Sixty participants attended the symposium. For more information, contact **Cortland Eble** at (859) 257-5500 or by e-mail at eble@kgs.mm.uky.edu. ❖

Economic and engineering geology in western Kentucky

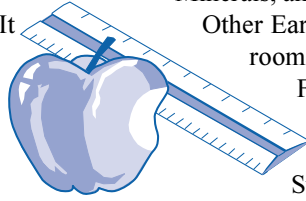
Several KGS geologists organized the annual field conference of the Kentucky Society of Professional Geologists (KSPG), November 3–4, 2000, to explore the economic and engineering geology of the Jackson Purchase area in western Kentucky. Fifty participants visited five locations: the Old Hickory Clay Company's Marshall Clay Pit in Graves County; Old Hickory's clay-processing plant; a sand and gravel mining operation that provides material for construction aggregate; a creek in Marshall County where bodies of sand have been thrust through clay layers, possibly as a result of earthquake activity; and a landslide-remediation project in Hickman in Fulton County. The field trip also included a tour of one of the largest limestone quarries in the United States—Reed Quarry in Livingston County, owned by the Vulcan Materials Company. An electronic version of the field trip guidebook can be found at the KSPG Web site at www.kspg.org. For more information, contact **Bart Davidson** at (859) 257-5500 or by e-mail at bdavidson@kgs.mm.uky.edu. ❖

Awards and appointments

- ♦ **Jerry Weisenfluh** was appointed to the Governor's Geographic Information Advisory Council. The council promotes and supports the effective and efficient sharing and use of geographic information and related resources throughout the Commonwealth.
- ♦ **Donald Haney**, State Geologist Emeritus of KGS, was presented the I.C. White Award, given to persons whose outstanding geologic and professional contributions have advanced the knowledge of the Appalachian Basin. The award, presented to Haney in September 2000, is one of the highest honors bestowed by the Eastern Section of the American Association of Petroleum Geologists.
- ♦ In September 2000, **Steve Greb** and **Dave Williams** were awarded the Ralph L. Miller Memorial Award of the Eastern Section of the American Association of Petroleum Geologists for their paper, "Mining Geology of Western Kentucky Coals," published in 1999 in the *AAPG Bulletin*. Greb and Williams also received the award in 1996 and 1998.
- ♦ After 15 years at KGS, **David Wunsch** became the State Geologist of New Hampshire in September 2000. Wunsch is the second geologist from KGS to be appointed as a state geologist. Norman Hester, who worked at KGS from 1978–80, served as the State Geologist of Indiana from 1986–98.
- ♦ **John Kiefer** was appointed to the Board of Directors of the Central United States Earthquake Consortium (CUSEC). As a consortium of state emergency-management agencies, CUSEC is focused on addressing matters related to earthquake hazards. Kiefer has been working with CUSEC since its founding in 1985. ❖

Twenty state science supervisors attended the keynote address, titled “Misunderstanding and Misconceptions About Earth Science—Sometimes It Is All in the Wording,” presented by **Steve Greb** at the annual meeting of the Mid-Atlantic Section of the Association for Education of Teachers in Science. Greb gave the invited talk at Cumberland Falls, Ky., on September 15, 2000.

KGS continued a longstanding tradition of maintaining an information exhibit at the fall conference of the Kentucky Science Teachers Association in Lexington, November



2–3, 2000. Two workshops presented by **Steve Greb**, “Rocks, Minerals, and Earth Science Activities” and “Draw T-Rex and Other Earth Science Activities,” were filled with standing-room-only audiences of teachers from across the state.

For more information about these classroom activities, visit the KGS Web site at www.uky.edu/KGS/education/activities.html#kgs or contact Steve Greb at (859) 257-5500 or by e-mail at greb@kgs.mm.uky.edu. ❖

KSG mailing list

Would you like to receive the KGS newsletter and announcements of meetings and new publications? If so, we would like to add your name to our electronic mailing list. Please call us at (859) 257-5500 or send an e-mail message to

Jennifer Talley at jtalley@kgs.mm.uky.edu—simply type “Electronic-Mailing List Addition” in the subject line of your message, type your mailing address and phone and fax number in the message—and we will include your name and address in our mailing list. ❖

Calendar of events

- ♦ **April 2, 2001:** KGS Distinguished Lecture, Dr. Patricia Wood Dickerson, NASA Johnson Space Center
- ♦ **April 5–6, 2001:** Southeastern Section, Geological Society of America, 50th annual meeting, Raleigh, N.C., www.geosociety.org/sectdiv/southe/01semtg.htm
- ♦ **April 23–25, 2001:** North-Central Section, Geological Society of America, 35th annual meeting, Bloomington-Normal, Ill., www.geosociety.org/sectdiv/Northc/01ncmtg.htm
- ♦ **April 27, 2001:** KGS Annual Seminar, Well Sample and Core Library, Lexington, Ky.
- ♦ **June 3–6, 2001:** American Association of Petroleum Geologists, annual convention, Denver, Colo., www.aapg.org/indexaapg.html ❖

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